

AMENDMENTS TO THE CLAIMS

Please amend the claims as follows:

Claim 1 (Currently Amended): A method Method of obtaining a gain function from
~~by means of~~ an array of antennae and a weighting of the signals received or to be transmitted
by vectors (\bar{b}) of N complex coefficients, referred to as weighting vectors, N being the
number of antennae in the array, comprising the steps of: ~~characterised in that, a reference~~
~~gain function being given the said reference gain function is projected orthogonally onto the~~
~~sub-space of the gain functions generated by the said weighting vectors of the space of the~~
~~gain functions, previously provided with a norm, and in that there is chosen, as the optimum~~
~~weighting vector, a weighting vector generating the reference gain function thus projected~~
generating a sub-space which is normed and orthogonal with respect to a space of
gain functions, the gain functions being generated by the weighting vectors;
projecting a desired reference function onto the sub-space; and
choosing a weighting vector which generates a gain function approximate to the
projection of the desired reference gain function in the sub-space, as an optimum weighting
vector.

Claim 2 (Currently Amended): The method Method of obtaining the ~~a~~ reference gain
function according to Claim 1, wherein ~~characterised in that~~ the gain functions are
represented by vectors (\bar{G}), referred to as gain vectors, of M complex samples taken at M
distinct angles, defining sampling directions and belonging to the angular range covered by
the array, further comprising:

~~the space of the gain functions then being the vector space C^M provided with the~~
~~Euclidian norm, and in that, for a given frequency (f), the reference gain vector is projected~~

~~onto the vector sub-space ($\text{Im}f$) of the gain vectors generated by the array operating at the said frequency in order to obtain the said optimum weighting vector~~

providing the space of the gain functions being the vector space C^M with an Euclidian norm; and

projecting the reference gain function for a given frequency (f) onto the vector sub-space ($\text{Im}f$) of the gain vectors generated by the array operating at the frequency in order to obtain the optimum weighting vector.

Claim 3 (Currently Amended): The method ~~Method~~ of obtaining the a-reference gain function according to Claim 2, wherein ~~characterised in that~~ M is chosen such that $M > \pi N$.

Claim 4 (Currently Amended): The method ~~Method~~ of obtaining the a-reference gain function according to Claim 2 or 3, wherein ~~characterised in that the sampling the M distinct angles are uniformly distributed in the angular range covered by the array.~~

Claim 5 (Currently Amended): The method ~~Method~~ of obtaining the a-reference gain function according to Claim 2, wherein ~~characterised in that~~ the reference gain function is obtained by sampling the reference gain function after an anti-aliasing filtering.

Claim 6 (Currently Amended): The method ~~Method~~ of obtaining the a-reference gain function according to Claim 2 ~~one of Claims 2 to 5, further comprising: characterised in that,~~

transforming the gain vectors (\bar{G}) being the transforms by a linear application (h_s^f)
of C^N in C^M of the weighting vectors of the array and Hf being the matrix $[[,]]$ of size $M \times N[[,]]$ of the ~~said~~ linear application of a starting base of C^N in an arrival base C^M , the ~~said~~ optimum weighting vector $[[,]]$ for a given frequency $f[[,]]$ is obtained from the reference gain

vector \bar{G} as $\bar{b} = H_f^+ \cdot \bar{G}$ ~~where~~ wherein $H_f^+ = (H_f^{*T} \cdot H_f)^{-1} \cdot H_f^{*T}$ is the pseudo-inverse matrix of the matrix H_f and where H_f^{*T} is the conjugate transpose of the matrix H_f .

Claim 7 (Currently Amended): The method ~~Method~~ of obtaining the a-reference ~~a-reference~~ gain function according to Claim 6, wherein ~~characterised in that~~, the said starting base being that of the vectors $\bar{e}_k, k=0, \dots, N-1$, such that $\bar{e}_k = (e_k, 0, e_k, 1, \dots, e_k, N-1)^T$ with

$$e_{k,i} = \exp(j \cdot \frac{2\pi f d}{c} \cdot i \cdot \sin \theta_k) \text{ and } \theta_k = k\pi / N, \quad k = -(N-1)/2, \dots, 0, \dots, (N-1)/2 \text{ and the}$$

arrival base being a canonical base, the matrix H_f ~~has as its~~ having the components:

$$H_{pq} = \exp(j(N-1)\Psi_{pq}/2) \cdot \frac{\sin(N\Psi_{pq}/2)}{\sin(\Psi_{pq}/2)} \text{ with } \Psi_{pq} = \pi\eta(\sin(p\pi/N) - \sin(q\pi/M)) \text{ and}$$

$\eta = f/f_0$ with $f_0 = c/2d$, d being the pitch of the array.

Claim 8 (Currently Amended): The method ~~Method~~ of obtaining the a-reference ~~a-reference~~ gain function according to Claim 6 ~~or 7~~, ~~characterised in that~~ wherein the reference gain vector is obtained by sampling the gain function generated at a first operating frequency f_1 of the array by using means ~~of~~ a first weighting vector \bar{b}_1 and ~~in that~~ wherein the optimum weighting gain vector for a second frequency f_2 is obtained by $\bar{b}_2 = H_{f_2}^+ \cdot H_{f_1} \cdot \bar{b}_1$.

Claim 9 (Currently Amended): The method ~~Method~~ of obtaining the a-reference ~~a-reference~~ gain function according to Claim 8, ~~characterised in that~~ wherein the operating frequency f_1 of the array is the frequency of an uplink between a mobile terminal and a base station in a mobile telecommunication system and in that the operating frequency f_2 of the array is the frequency of a downlink between the ~~said~~ base station and the ~~said~~ mobile terminal.

Claim 10 (New): The method of obtaining the gain function according to Claim 7, wherein the reference gain vector is obtained by sampling the gain function generated at a first operating frequency f_1 of the array using a first weighting vector \bar{b}_1 and wherein the optimum weighting gain vector for a second frequency f_2 is obtained by $\bar{b}_2 = H_{f_2}^+ \cdot H_{f_1} \cdot \bar{b}_1$.

Claim 11 (New): The method of obtaining the gain function according to Claim 3, further comprising:

transforming the gain vectors (\bar{G}) by a linear application (h_s^f) of C^N in C^M of the weighting vectors of the array and H_f being a matrix of size $M \times N$ of the linear application of a starting base of C^N in an arrival base C^M , the optimum weighting vector for a given frequency f is obtained from the reference gain vector \bar{G} as $\bar{b} = H_f^+ \cdot \bar{G}$ wherein $H_f^+ = (H_f^{*T} \cdot H_f)^{-1} \cdot H_f^{*T}$ is the pseudo-inverse matrix of the matrix H_f and where H_f^{*T} is the conjugate transpose of the matrix H_f .

Claim 12 (New): The method of obtaining the gain function according to Claim 1, wherein the norm provided to the vector space is an Euclidian norm.

Claim 13 (New): The method of obtaining the gain function according to Claim 2, further comprising:

approximating a vector of samples of the reference gain function by using a linear combination of base vectors.

Claim 14 (New): The method of obtaining the gain function according to Claim 1,
wherein the array of antennae is a circular array.